

Claims:

1. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.003 % or less of C; 0.003 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; at least one of 0.03 ~ 0.2 % of Mn and 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein, when the steel sheet comprises one of Mn and Cu, a composition of Mn, Cu, and S satisfies at least one relationship:  $0.58 \times \text{Mn}/\text{S} \leq 10$  and  $1 \leq 0.5 \times \text{Cu}/\text{S} \leq 10$ , and when the steel sheet comprises both Mn and Cu, a composition of Mn, Cu, and S satisfies the relationships:  $\text{Mn} + \text{Cu} \leq 0.3$  and  $2 \leq 0.5 \times (\text{Mn} + \text{Cu})/\text{S} \leq 20$ , and wherein precipitates of MnS, CuS, and (Mn, Cu)S have an average size of 0.2  $\mu\text{m}$  or less.
2. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.003 % or less of C; 0.005 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.05 ~ 0.2 % of Mn; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a composition of Mn and S satisfies the relationship:  $0.58 \times \text{Mn}/\text{S} \leq 10$  in terms of weight, and wherein precipitates of MnS have an average size of 0.2  $\mu\text{m}$  or less.
3. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.015 % or less of P.

4. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.004 % or less of N.

5. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 0.03 ~ 0.2 % of P.

6. The steel sheet as set forth in claim 2, further comprising at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

7. The steel sheet as set forth in claim 2, wherein the steel sheet comprises 10 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

8. The steel sheet as set forth in claim 7, wherein the composition of Al and N satisfies the relationship:  $1 \leq 0.52 * Al/N \leq 5$ .

9. The steel sheet as set forth in any one of claims 2 to 8, further comprising 0.01 ~ 0.2 % of Mo.

15 10. The steel sheet as set forth in any one of claims 2 to 8, further comprising 0.01 ~ 0.2 % of V.

11. The steel sheet as set forth in claim 10, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

12. The steel sheet as set forth claim 9, further comprising 0.01 ~ 0.2 % of V.

13. The steel sheet as set forth in claim 12, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

5           14. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.0005 ~ 0.003 % or less of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.01 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a composition of Cu and S satisfies the relationship:  $1 \leq 0.5 * Cu/S \leq 10$ , and wherein precipitates of CuS have an  
10          average size of 0.1  $\mu m$  or less.

15. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.015 % or less of P.

16. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.004 % or less of N.

15           17. The steel sheet as set forth in claim 14, wherein the composition of Cu and S satisfies the relationship:  $1 \leq 0.5 * Cu/S \leq 3$ .

18. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 0.03 ~ 0.2 % or less of P.

19. The steel sheet as set forth in claim 14, further comprising at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

20. The steel sheet as set forth in claim 14, wherein the steel sheet comprises 5 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

21. The steel sheet as set forth in claim 20, wherein the composition of Al and N satisfies the relationship:  $1 \leq 0.52*Al/N \leq 5$ .

22. The steel sheet as set forth in any one of claims 14 to 21, further comprising 0.01 ~ 0.2 % of Mo.

10 23. The steel sheet as set forth in any one of claims 14 to 21, further comprising 0.01 ~ 0.2 % of V.

24. The steel sheet as set forth in claim 23, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25*V/C \leq 20$ .

25. The steel sheet as set forth in claim 22, further comprising 0.01 ~ 0.2 % of V.

15 26. The steel sheet as set forth in claim 25, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25*V/C \leq 20$ .

27. A cold rolled steel sheet having aging resistance and excellent formability, comprising: 0.0005 ~ 0.003 % or less of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.03 ~ 0.2 % of Mn; 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities in terms of weight%, wherein a composition of Mn, Cu, and S satisfies the relationship:  $Mn+Cu \leq 0.3$  and  $2 \leq 0.5*(Mn+Cu)/S \leq 20$ , and wherein precipitates of MnS, CuS, and (Mn, Cu)S have an average size of 0.2  $\mu m$  or less.
28. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.015 % or less of P.
- 10 29. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.004 % or less of N.
30. The steel sheet as set forth in claim 27, wherein the number of precipitates is  $2 \times 10^6$  or more.
- 15 31. The steel sheet as set forth in claim 27, wherein the composition of Mn, Cu and S satisfies the relationship:  $2 \leq 0.5*(Mn+Cu)/S \leq 7$ .
32. The steel sheet as set forth in claim 31, wherein the number of precipitates is  $2 \times 10^8$  or more.

33. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.03 ~ 0.2 % or less of P.

34. The steel sheet as set forth in claim 27, further comprising at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

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35. The steel sheet as set forth in claim 27, wherein the steel sheet comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

36. The steel sheet as set forth in claim 35, wherein the composition of Al and N satisfies the relationship:  $1 \leq 0.52*Al/N \leq 5$ .

10 37. The steel sheet as set forth in any one of claims 27 to 36, further comprising 0.01 ~ 0.2 % of Mo.

38. The steel sheet as set forth in any one of claims 27 to 36, further comprising 0.01 ~ 0.2 % of V.

15 39. The steel sheet as set forth in claim 38, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25*V/C \leq 20$ .

40. The steel sheet as set forth in claim 39, further comprising 0.01 ~ 0.2 % of V.

41. The steel sheet as set forth in claim 37, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25*V/C \leq 20$ .

42. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab with finish rolling at an  $Ar_3$  transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of  $1,100^{\circ}\text{C}$  or more, the steel slab comprising 0.003 % or less of C; 0.005 ~ 0.03 % of S; 0.01 ~ 0.1 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.05 ~ 0.2 % of Mn; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Mn and S satisfies the relationship:  $0.58*Mn/S \leq 10$ ; cooling the steel sheet at a speed of 200  $^{\circ}\text{C}/\text{min}$  or more; coiling the cooled steel sheet at a temperature of  $700^{\circ}\text{C}$  or less; cold rolling the steel sheet; and continuous annealing the cold rolled steel sheet.

43. The method as set forth in claim 42, wherein the steel slab comprises 0.015 % or less of P.

44. The method as set forth in claim 42, wherein the steel slab comprises 0.004 % or less of N.

45. The method as set forth in claim 42, wherein the steel slab comprises 0.03 ~ 0.2 % of P.

46. The method as set forth in claim 42, wherein the steel slab further comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

47. The method as set forth in claim 42, wherein the steel slab comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

5       48. The method as set forth in claim 47, wherein the composition of Al and N satisfies the relationship:  $1 \leq 0.52 * Al/N \leq 5$ .

49. The method as set forth in any one of claims 42 to 48, wherein the steel slab further comprises 0.01 ~ 0.2 % of Mo.

10       50. The method as set forth in any one of claims 42 to 48, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

51. The method as set forth in claim 50, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

15       52. The method as set forth in claim 49, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

53. The method as set forth in claim 52, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

54. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab with finish rolling at an Ar<sub>3</sub> transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more, the steel slab comprising 0.0005 ~ 0.003 % of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.01 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Cu and S satisfies the relationship:  $1 \leq 0.5 \times \text{Cu}/\text{S} \leq 10$ ; cooling the steel sheet at a speed of 300 °C/min; coiling the cooled steel sheet at a temperature of 700 °C or less; cold rolling the wound steel sheet; and continuous annealing the cold rolled steel sheet.

55. The method as set forth in claim 54, wherein the steel slab comprises 0.015 % or less of P.

56. The method as set forth in claim 54, wherein the steel slab comprises 0.004 % or less of N.

57. The method as set forth in claim 54, wherein the composition of Cu and S satisfies the relationship:  $1 \leq 0.5 \times \text{Cu}/\text{S} \leq 3$ .

58. The method as set forth in claim 54, wherein the steel slab comprises 0.03 ~ 0.2 % or less of P.

59. The method as set forth in claim 54, wherein the steel slab further comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

60. The method as set forth in claim 54, wherein the steel slab comprises 0.005 ~ 0.02 % of N and 0.03 ~ 0.06 % of P.

5        61. The method as set forth in claim 60, wherein the composition of Al and N satisfies the relationship:  $1 \leq 0.52 * Al/N \leq 5$ .

62. The method as set forth in any one of claims 54 to 61, wherein the steel slab further comprises 0.01 ~ 0.2 % of Mo.

10        63. The method as set forth in any one of claims 54 to 61, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

64. The method as set forth in claim 63, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

15        65. The method as set forth in claim 62, further comprising 0.01 ~ 0.2 % of V.

66. The method as set forth in claim 65, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

67. A method of manufacturing a cold rolled steel sheet having aging resistance and excellent formability, comprising the steps of: hot-rolling a steel slab with finish rolling at an Ar<sub>3</sub> transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more, the steel  
5 slab comprising: 0.0005 ~ 0.003 % of C; 0.003 ~ 0.025 % of S; 0.01 ~ 0.08 % of Al; 0.02 % or less of N; 0.2 % or less of P; 0.03 ~ 0.2 % of Mn; 0.005 ~ 0.2 % of Cu; and the balance of Fe and other unavoidable impurities, in terms of weight%, wherein a composition of Mn, Cu, and S satisfies the relationships: Mn+Cu≤0.3 and 2≤0.5\*(Mn+Cu)/S≤20; cooling the steel sheet at a speed of 300 °C/min; coiling the  
10 cooled steel sheet at a temperature of 700 °C or less; cold rolling the wound steel sheet; and continuous annealing the cold rolled steel sheet.

68. The method as set forth in claim 67, wherein the steel slab comprises 0.015 % or less of P.  
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69. The method as set forth in claim 67, wherein the steel slab comprises 0.004 % or less of N.

70. The method as set forth in claim 67, wherein the number of precipitates is 2x10<sup>6</sup> or more.  
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71. The method as set forth in claim 67, wherein the composition of Mn, Cu and S satisfies the relationship: 2 ≤0.5\*(Mn+Cu)/S ≤7.

72. The method as set forth in claim 71, wherein the number of precipitates is  $2 \times 10^8$  or more.

73. The method as set forth in claim 67, wherein the steel slab comprises 0.03  
5 ~ 0.2 % or less of P.

74. The method as set forth in claim 67, wherein the steel slab further  
comprises at least one of 0.1 ~ 0.8 % of Si and 0.2 ~ 1.2 % of Cr.

75. The method as set forth in claim 67, wherein the steel slab comprises 0.005  
~ 0.02 % of N and 0.03 ~ 0.06 % of P.

10 76. The method as set forth in claim 75, wherein the composition of Al and N  
satisfies the relationship:  $1 \leq 0.52 * Al/N \leq 5$ .

77. The method as set forth in any one of claims 67 to 76, wherein the steel  
slab further comprises 0.01 ~ 0.2 % of Mo.

15 78. The method as set forth in any one of claims 67 to 76, wherein the steel  
slab further comprises 0.01 ~ 0.2 % of V.

79. The method as set forth in claim 78, wherein the composition of V and C  
satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .

80. The method as set forth claim 77, wherein the steel slab further comprises 0.01 ~ 0.2 % of V.

81. The method as set forth in claim 80, wherein the composition of V and C satisfies the relationship:  $1 \leq 0.25 * V/C \leq 20$ .